

REMARKS

In the outstanding Office Action, claims 1, 2, 6, 8, 11, 13, 15 and 17 were rejected under 35 U.S.C. § 103(a). Claims 3-5, 9, 12, 14, 16, and 18 were allowed, and claims 7 and 10 were objected to for containing allowable subject matter, but depending on a rejected base claim. Applicants appreciate the Examiner's indication of allowable subject matter.

With the present amendment, Applicants have amended claims 1 and 6. Support for the amendments can be found in the specification at, for example, page 13, lines 1-5 and page 36, lines 18-20. Additionally, Applicants have added claims 19-22. Support can be found for these new claims in the specification at, for example, page 34, lines 6-7. Claims 1-22 are currently pending.

Rejections under 35 U.S.C. § 103(a)

Claims 1, 2, 6, 8, 11, 13, 15 and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bashir et al., U.S. Patent no. 5,827,762 ("Bashir") in view of Weiner, U.S. Patent no. 5,569,624 ("Weiner"). Applicants respectfully traverse this rejection.

To establish a *prima facie* case of obviousness under 35 U.S.C. §103(a), each of three requirements must be met. First, the reference or references, taken alone or combined, must teach or suggest each and every element recited in the claims. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of the three

requirements must "be found in the prior art, and not be based on applicant's disclosure." See M.P.E.P. §2143, (8th ed., 2001).

Claims 1 and 6, as amended, recite a combination including, *inter alia*, "irradiating energy beams to heat said silicide film so that ... [an] impurity is diffused to control a work function of said silicide film." Bashir, whether taken alone or in combination, fails to teach or suggest at least this limitation.

Bashir is directed to a method of forming buried interconnect structures in CMOS devices (col. 3, lines 3-15). Bashir deposits a silicide film, and then dopes the silicide film with both phosphorus and boron, in order to form N⁺ and P⁺ regions (col. 4, lines 15-37). However, Bashir fails to teach at least, "irradiating energy beams to heat said silicide film so that ... [an] impurity is diffused to control a work function of said silicide film" as required by claims 1 and 6. Moreover, as the examiner stated, "Bashir et al. is silent with respect to the irradiation step" (page 3, line 7 of Office Action).

Weiner does not cure the deficiencies of Bashir. Weiner, cited for allegedly teaching the irradiating step, is directed to a method for doping, which uses pulsed laser processing to heat a silicide layer in order to diffuse dopants into a silicon layer through an existing contact (col. 2, lines 35-52). The pulsed laser heats, but does not melt, the silicide layer, thus facilitating the diffusion of high levels of dopants into the silicide layer (col. 4, lines 40-55). However, Weiner does not teach or suggest "irradiating energy beams to heat said silicide film so that ... [an] impurity is diffused to control a work function of said silicide film" (emphasis added) as required by claims 1 and 6.

Generally, a threshold value or work function of the gate electrode in question is determined by its composition formed on the gate insulation film. The threshold value

or work function of the gate electrode, however, cannot be changed by merely doping an impurity into the gate electrode composition. It is essential to dope an impurity into the gate electrode composition and to reach or diffuse it to the interface between the gate insulation film and the gate electrode. In short, the threshold or work function of the gate electrode cannot be altered until and unless the impurity reaches or diffuses to the interface between the gate insulation film and the gate electrode. Such diffusion is not achieved by merely using laser energy to drive the implantation into the silicide, as taught in Weiner.

Since the references, whether taken alone or in combination, fail to teach or suggest at least the element, "irradiating energy beams to heat said silicide film so that ... [an] impurity is diffused to control a work function of said silicide film," as required by claims 1 and 6, a *prima facie* case of obviousness has not been made.

Moreover, even if the combination of Bashir and Weiner could be construed as teaching each and every element of claims 1 and 6, there is no motivation for combining the references in the manner that the Examiner is suggesting. Weiner, as discussed above, teaches using a pulsed laser to facilitate the diffusion of dopants or impurities into a silicide layer (col. 4, lines 40-55). The Examiner then states that given this teaching in Weiner, "[i]t would have been obvious to one of ordinary skill in the art at the time of the invention" to have used the teaching of Weiner in the process of Bashir "in order to drive the impurity to the portion of the silicide where it is desired" (Office Action at page 3). However, Bashir states that the implanted impurities diffuse into the silicide layer (col. 6, lines 15-19). Since the process of Bashir does not have difficulties in diffusing impurities into the silicide layer, there is no need to use an extra, expensive

process, such as using a pulsed laser, to facilitate diffusion. Therefore, there is no motivation to combine the pulsed laser diffusion process of Weiner with the interconnect forming method of Bashir. Thus, a *prima facie* case of obviousness has not been made, and the rejection of claims 1 and 6 under 35 U.S.C. § 103(a) should be withdrawn.

Furthermore, claims 2, 11, and 15, and claims 8, 13, and 17, respectively depend from claims 1 and 6, and thus require all of the respective elements of claims 1 and 6. Since Bashir and Weiner, whether taken alone or in combination, fail to teach at least the element, "irradiating energy beams to heat said silicide film so that ... [an] impurity is diffused to control a work function of said silicide film," as required by claims 1 and 6 (discussed above), the references do not teach each and every element of claims 1 and 6. Thus, the references also do not teach each and every element of respective claims 2, 11 and 15, and claims 8, 13, and 17, and a *prima facie* case of obviousness has not been made. Therefore, the rejection of claims 2, 11 and 15, and claims 8, 13, and 17, under 35 U.S.C. § 103(a) should be withdrawn.

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: October 29, 2004

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